THE MAKING OF AN AMERICAN SPEAKER

The successor to JBL's classic L100 loudspeaker upholds a tradition of craftsmanship and innovative engineering.

BY IAN G. MASTERS

WHY James B. Martini changed his last name to Lansing when he moved to California in the mid-1920's is obscure, but in doing so he created a name that for many people symbolizes American audio, one that is still borne by the two companies he was associated with during his short life, Altec Lansing and JBL.

Although Lansing's first products, domestic radio speakers, were forerunners of today's consumer audio products, he made his reputation in the field of professional audio. At a time when the major challenge was to produce sufficient speaker output to fill a movie theater using only the low-powered amplifiers then available, Lansing turned his talents to the development of high-efficiency, flat-wire voice coils and vented low-frequency horn transducers (the landmark Altec "Voice of the Theatre" speaker system was one project on which he worked). Early audiophiles who could afford them bought these speakers for home use, as there was nothing else on the market that would satisfy their demands for good music reproduction.

Forty years after Jim Lansing's death, the James B. Lansing Co.—its name long since shortened to JBL—remains true to his roots in professional sound; it is still a leading supplier of sound-reinforcement speakers and studio monitors. But JBL, now a division of Harman International, has also used its pro expertise to produce high-quality speakers for the home market since its 1954 introduction of the Hartsfield corner-horn model, which JBL says still holds the record for being its "most-requested" speaker ever.

In 1977 Dr. Sidney Harman, who had owned JBL since 1969, sold it and several other audio companies he had acquired or founded, including Harman Kardon, to become Undersecretary of Commerce in President Carter's administration, but three years later, a private citizen again, he began to reacquire some of his former companies—notably JBL and Harman Kardon. In the process, he also picked up Infinity, Epicure, Pyle, and Concord along with two professional audio companies, Urei and Soundcraft, a leading European transducer manufacturer, Audax of France, and a Danish enclosure maker, Lydig.

As Sidney Harman sees it, manufacturing speakers from the ground up is, and always has been, a key element in the success of JBL. "If you are genuinely interested in putting out a product that is fundamentally better, you have to make it yourself," he told us. "Here, we are specifically devoted to music; the mix of technology and love of music is what makes the audio business special."

Engineer John Eargle, who has been associated with JBL since 1977, agrees. "The founders of the hi-fi business in this country—Rudy Bozak, Paul Klipsch, Frank McIntosh, Saul Marantz, Sid Harman [and Edgar Villchur, and Henry Kloss, and Amar Bose, to name a few others]—

did it out of a love of music," he said. "If you're really an audio person you just can't do anything else; even if you can, you usually don't want to."

The Harman/JBL factory occupies 440,000 square feet of space (30,000 feet are devoted to a new Harman Electronics plant) in California's San Fernando Valley. The factory makes practically everything that goes into a JBL speaker, the major exceptions being crossover networks, woofer cones, and some elements used in lower-cost speakers (and all these components are subject to rigid quality-assurance tests when they are delivered to the factory). One result of that, according to Harman, is the possibility of establishing tighter tolerances for the components that go into a speaker. "The consumer *gets* something out of all this: The chances are very high that if he buys a pair of JBL speakers, the left one will perform exactly like the right, and both will perform identically to the ones he heard in the showroom."

For most of the past year, JBL designers and engineers have been working on an upgrade of one of the company's best-known speakers, the L100. The new version, the L100t3, is now reaching the market. Although it shares the name of a classic speaker and ultimately derives from the original, it is a new device.

Like many of the early JBL models, the original L100, introduced in 1969, was essentially a "studio monitor in walnut," as one marketing manager put it. It was decided that the new version would be based on the company's current three-way studio monitor, the Model 4412, using the same transducers—including a titanium-dome tweeter, hence the "t" in the model name. But the crossover would be reworked with "audiophile subtlety" to give the system a new overall sound, a process that JBL calls "voicing." Moreover, instead of the Model 4412's bookshelf configuration, the L100t3 would be a floor-standing system using a new type of enclosure called a "six-sided lock miter." As is usual in product development, the details were worked out in extended negotiations between design, production, and marketing personnel.

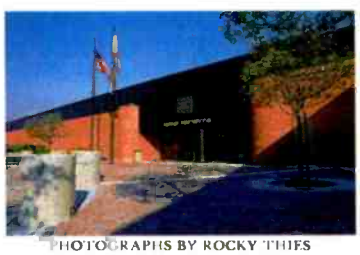
The main design challenge was to bring the selected transducers and enclosure together in a speaker that would be true to its origins and yet as technologically sophisticated as possible. The first step was to test the individual drivers in the development lab's anechoic chamber—or, in the case of the woofer, on the factory roof—to find out exactly what each one did.

Next, a prototype of the enclosure was constructed in the lab. The drivers were mounted in it and measured again to determine how they would interact with the cabinet. Finally, the development engineer went to work designing a crossover that would bring all these elements together in a good speaker system.

Since the L100t3 was to use existing transducers, it was a straightforward job to prepare for production—no retooling was required. Like all JBL products, it uses high-efficiency, edge-wound voice coils and cast-aluminum woofer baskets. Because it is a high-end model, however, much of the assembly of these components is done by hand.

By the time a speaker actually reaches production, the hardest work has been done. In the case of the new version of the venerable L100, the process of determining what kind of speaker was wanted, examining the technological and production options, consulting with the relevant staff, testing the components, building the prototype, retesting the assembled system, designing the crossover, listening to the result, making adjustments, and, finally, gearing up for production took some 900 man-hours, including some for wrong turns along the way.

We were able to see how the design of the L100t3 becomes a reality during a special factory tour. □



PHOTOGRAPHS BY ROCKY THIES

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1. Although the JBL L100t3 is derived from an existing professional monitor, its "six-sided lock miter" enclosure is all new. It began as a series of detailed drawings produced by the JBL engineering department.

2. Before incorporating drivers in a speaker system, a designer must know the specific characteristics of each one. The L100t3's tweeter and midrange were tested in the engineering lab's anechoic chamber, but it was too small to represent frequencies below about 500 Hz with any accuracy. In order to measure the free-field response of the L100t3's woofer, the development engineer resorted to the world's largest anechoic chamber, the great outdoors, using a special assembly on the roof of the JBL plant.

3. An initial battery of measurements was performed on the L100t3 prototype in the laboratory's anechoic chamber. Fine-tuning of the crossover network and of the relationship between drivers and enclosure—a process called "voicing"—took place at this stage. To help keep control of all aspects of its products, JBL designs and builds its own test and measurement instruments.

4. Ultimately it is how a speaker sounds that matters. Every new JBL model undergoes extensive listening tests by both the engineering and marketing staff. Only when both are satisfied with the result can the speaker proceed to manufacturing. An early version of the L100t3 failed at this stage because its sound differed too radically from that of its predecessor, the classic L100.

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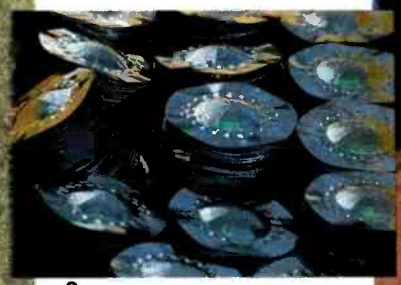

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5-6. Despite a general opinion that titanium is an "unworkable" metal, JBL pioneered its use in tweeter diaphragms because it combines lightness and stiffness. A diaphragm-forming machine uses a proprietary high-pressure process to stamp out tweeter domes for the L100t3, each one only a thousandth of an inch thick. The diamond pattern in the dome's surround increases its flexibility.

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7. To insure uniformity of response in L100t3 speakers, JBL uses an automated assembly to attach the tweeter diaphragm to the voice coil. In the photo, a hand points to where the machine is inserting a high-temperature adhesive at the critical joint.

8-10. Woofer voice coils are wound in "sticks," to be cut into proper lengths further along in the production process.

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11-13. The cast frames for the L100t3's woofers are electrostatically coated with an epoxy powder, which is then baked on, rather than being painted conventionally. One benefit is a pollution-free working environment.

14. Final assembly of the L100t3's woofer is performed on a turntable that spins the basket to allow even application of the glue that will hold the cone-coil combination in place.

15. Every transducer—in fact, every voice coil—is individually tested against an engineering prototype in one of the many quality-assurance stations in the JBL factory.

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16-21. Panels for the L100t3's enclosure are cut from veneered particle board in JBL's own wood mill. The side panels are cut in a single piece, and a saw makes V-shaped grooves through the board—but not the veneer—where the cabinet edges will fall. The crossover network is mounted and the pre-cut side piece is folded around the front and back panels to produce the finished enclosure. Tolerances are very tight to insure that the cabinet fits together with no air leaks.

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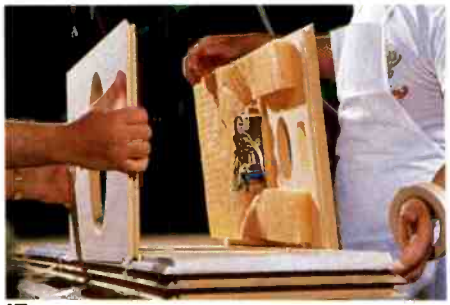

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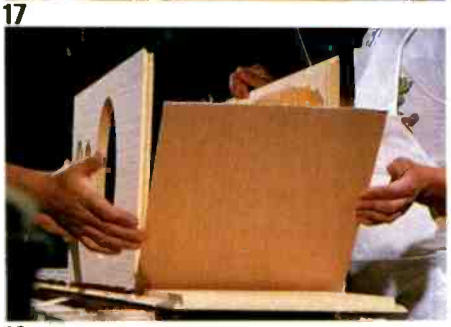

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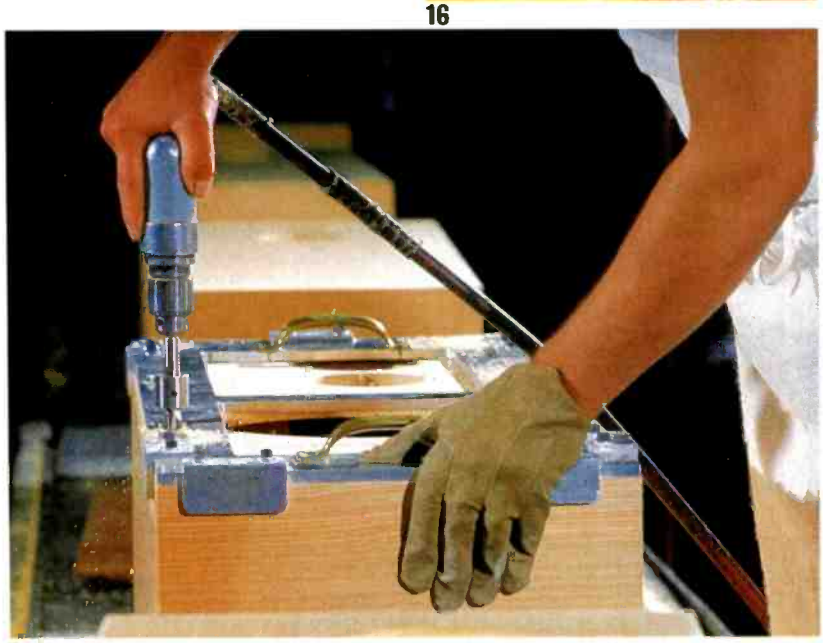

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JBL IN JAPAN

BY

BRYAN HARRELL

TOKYO—*Though countless Americans think of Japan as the leader in audio equipment, many Japanese audiophiles have historically considered certain categories of American and European audio gear superior—namely, phono cartridges and loudspeakers. Local wisdom has it that the Japanese are good at mathematics and equations, making possible the production of efficient hardware, but are less adept at the subjective artistic judgments involved in transducer craftsmanship.*

"When it comes to loudspeakers and cartridges, or entrance and exit devices, people in Japan, including the audiophile press, believe that foreign names are superior," I was told by Kohtaro Yasuda, the marketing director for JBL products in Japan.

The existence today of some excellent Japanese speakers and cartridges, and some rather poor Western counterparts, easily disproves this myth, though the fact that many Japanese still believe it makes for impressive foreign sales opportunities in a market more than half the size of the U.S. and larger than any European country.

Furthermore, imported loudspeakers are closely identified with their country of origin. Strong distinctions are often, and unjustifiably, made between a "California" sound, an "East Coast" sound, a "British" sound, and so on. No doubt these attributes give foreign products a certain "spice of identity," though image-conscious Japanese may pay more attention to the "aura" of a product than to the product itself.

In any case, the aura surrounding the JBL name in Japan has been strong for years. Nobody really knows when the first JBL loudspeaker was sold here, but Sansui began distributing the line officially in 1969. Four years ago, distribution was taken over by the Tokyo branch of Harman International, known as Harman Asia. According to Yasuda, sales have

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22-23. The cabinet's veneer is polished and the drivers are mounted in openings on the main panels during final assembly of the speaker.

24. After completed L100t3 speakers roll off the assembly line, they are packaged for shipment to dealers.

increased in that time despite aggressive inroads made by other speaker makers in Japan. Bose, especially, has built a large presence here in the last decade. "Each [manufacturer] has its own niche," Yasuda said, "though there must be some overlap, which is good for competition."

"The JBL name is prestigious [in Japan]," Yasuda continued. "Perception has a high value, and Harman Asia tries to reinforce this image." A large number of jazz coffee houses and live-music spots bear this out: JBL speakers are quite common and have a loyal following.

JBL speakers receive good press here, and they have won several Grand Prix awards. The JBL Everest DD55000 speaker was one of three loudspeakers (along with the McIntosh XRT-18 and the Diatone DS-1000) to win Stereo Sound*'s 1985 Golden Sound Award.*

The JBL name can also be seen at every important trade show and industry event in Japan. Last October, while JBL was represented at both the Japan Audio Fair and the Imported Audio Show (the only foreign name to be present at both events), Harman Asia also highlighted JBL products at its own three-day audio fair.

JBL sales in Japan are approximately one-third for professional use and two-thirds to consumers. That's a high ratio of pro-use sales, though Yasuda pointed out that it's often hard to determine how a product will be used once it is sold. "We're sure that the end users of some JBL professional products are actually ordinary consumers," he said.

Harman Asia is involved in some JBL product planning, although all the speakers are made in California. "The Japanese prefer certain characteristics," Yasuda said, "like very punchy bass and sharp, quick transients." Interestingly, the prize-winning Everest speakers, which retail in Japan for 2.7 million yen (about $22,500) a pair, were developed in conjunction with Harman Asia and sell predominantly in the Asian market. A few of those *ought to do something for the trade deficit.*